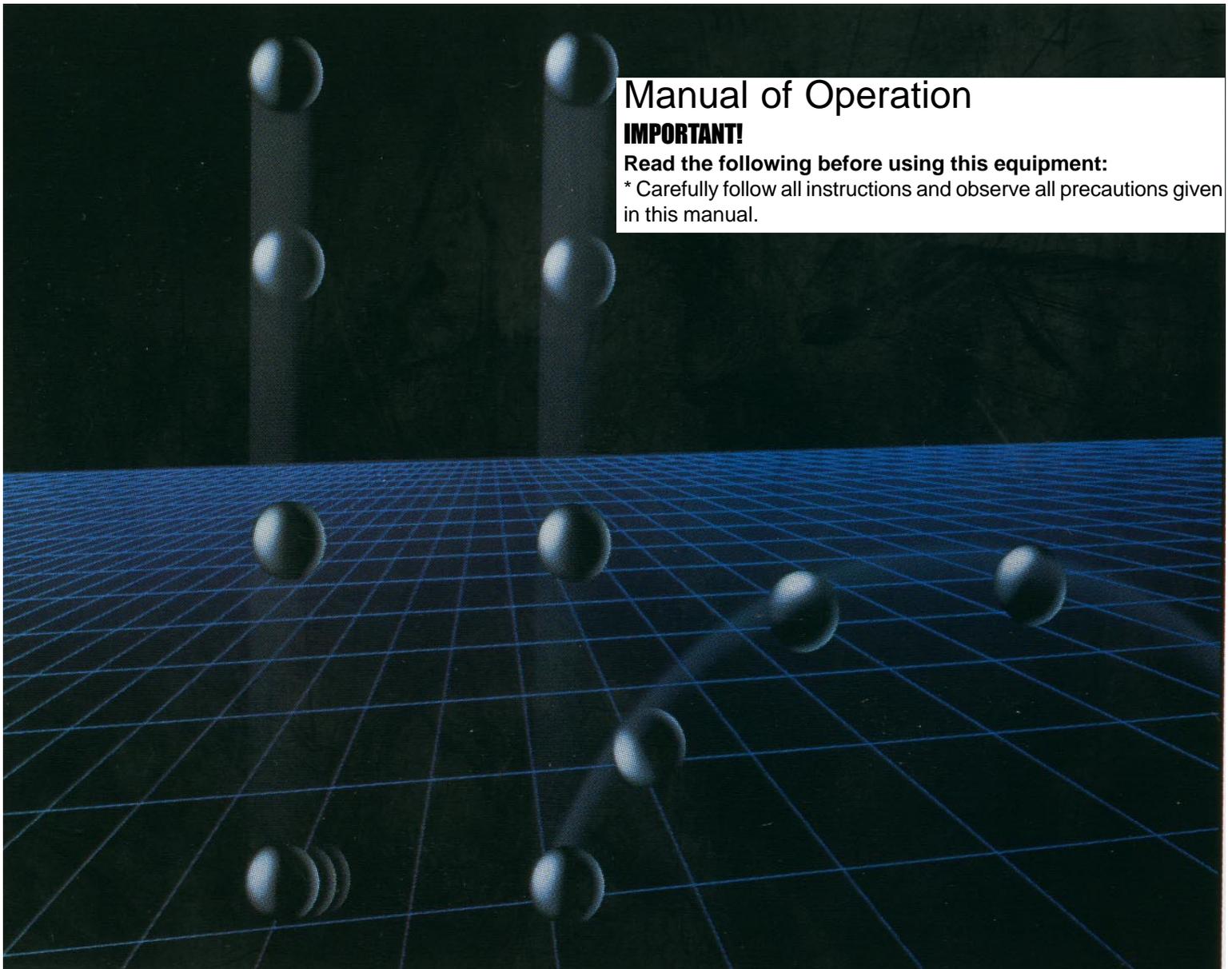


Actual Size



N99-P70-3840

**HAPPY & UNHAPPY BALLS**



## Manual of Operation

### **IMPORTANT!**

**Read the following before using this equipment:**

\* Carefully follow all instructions and observe all precautions given in this manual.

The “Unhappy Ball” is made of rubber called Norbornene polymer (brand name: Norsorex) which possesses excellent impact absorption properties. The rubber has great internal absorption of inputted energy and is able to dampen impact from a colliding object without giving the object a reaction force. It has the advantage whereby little resonance can be caused to occur by external vibrations. It can be processed in a similar manner to that of ordinary rubber, and sheets made of this material are utilized in a lot of applications. The “Happy Ball” is made of common neoprene.

**Characteristics**

1. Low restitution elasticity (less than 10%)
2. It has especially good energy absorption under normal temperature ranges (10 ~ 30 degrees Celsius)
3. Its absorption and insulation of high frequency vibrations are especially good.

Range of use

1. As damping material
  - ... for protection of conveyor mechanism, stoppers for precise location of articles conveyed, and shock absorbers (in place of pneumatic and hydraulic types).
2. Padding materials
  - ... for the prevention of things dropped from being scattered and for the reduction of fatigue on legs and loins.
3. Material for minimizing resonance on audio equipment
  - ... Prevention of speaker howl. Insulation of external vibration to player units.
4. Low hardness rubber roll material
  - ... Rolls for printing.
5. Footwear sole material
  - ... for the reduction of heelstrike.
6. Industrial use
  - ... gaskets and packing.
7. Sports goods
  - ... Gloves, mits, and supporters.

**Comparison of mechanical properties**

Item	Neoprene (Happy Ball)	Norsorex (Unhappy Ball)
Tensile strength (kg f/cm squared)	205	124
Stretch (%)	370	550
Hardness (JISA)	63	32
Restitution elasticity (%)	53	3
Compression permanent set (70 degrees Celsius x 22H%)	15	478
Specific Gravity	1.39	1.25

**Manufacturing method for Norsorex**

As shown in the diagram, Norsorex is obtained through the synthesis of Norbornene from Ethylene cyclopentadiene by the Diels-Alder’s reaction, then through ring opening polymerisation of the Norbornene monomer. Norsorex is a polymer which has a construction whereby double bonding and the five membered ring have been bonded alternately, which means that vulcanization can be done by utilizing this double bonding.

